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ABSTRACT

Current linguistic theory rigidly compartmentalizes the "cognitive," linguistic aspects of human communication and the presumed "emotive," paralinguistic elements that occur in both human and nonhuman communication. The segmental phonetic units of human speech, according to this view, are supposed to convey linguistically relevant information, e.g., the vowel distinction that differentiates the English words "bit" and "bet." Emotive, paralinguistic qualities are supposedly transmitted only by means of prosodic modifications like fundmental frequency, amplitude, and tempo as well gestures and facial expressions. Animals, according to this view, make use only of these "paralinguistic" parameters. This distinction is false. The same phonetic feature space is used for both paralinguistic and linguistic communication, and the semantic boundary line between these two aspects of human communication is not sharp. The foundations of human language can be seen in the paralinguistic aspects of human communication and in the vocal and gestural aspects of the communications of other animals. (Author)

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Linguistic and Paralinguistic Interchange

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ABSTRACT

Current linguistic theory rigidly compartmentalizes the "cognitive", linguistic aspects of human communication and the presumed "emotive", paralinguistic elements that occur in both human and nonhuman communication. The segmental phonetic units of human speech, according to this view, are supposed to convey linguistically relevant information, e.g. the vowel distinction that differentiates the English words bit and bet. Emotive, paralinguistic qualities are supposedly transmitted only by means of prosodic modifications like fundamental frequency, amplitude, and tempo as well as gestures and facial expressions. Nonhuman animals according to this view make use only of these "paralinguistic" parameters. This distinction is false. The same phonetic feature space is used for both paralinguistic and linguistic communication and the semantic boundary line between these two aspects of human communication is not sharp. The foundations of human language can be seen in the paralinguistic aspects of human communication and in the vocal and gestural aspects of the communications of other animals.

Current linguistic theory rigidly compartmentalizes the "linguistic" and "paralinguistic" aspects of human communication. Linguistic communication has been equated to the transmission of cognitive, referential information. Paralinguistic communication has been taken to relate to the transmission of "emotive" states. Implicit in this distinction is the notion that human language is the medium that allows modern man to think, that, in essence, language is the basis of cognitive ability. Hence the clearly unique aspects of human language, the ability of modern man to form words, phrases, etc., are considered linguistic. In contrast, the prosodic aspects of human language, that is, the modulations of pitch, amplitude and temporal pattern, which clearly play a part in the communications of other living species besides Homo sapiens, are considered paralinguistic.

This distinction between the supposedly paralinguistic and linguistic aspects of communication is misleading. While all animals do make use of innately determined cries to signal certain basic states of their autonomic vegetative systems, no clear distinction can be shown for many of the phenomena that are supposedly "paralinguistic" or "linguistic" in human, or for that matter in non-human, communication. The gasp of a drowning man is an example of an innately determined cry as is the cry of a rabbit or dog or a man in extreme pain. Darwin (1872) in The Expression of Emotion in Man and Animals, clearly differentiated these basic cries, which he noted were independent of habit or training, from the "emotive" information that linguists often classify as "paralinguistic". Linguists, in general, tend to classify the transmission of information as paralinguistic when they lack adequate notational systems. If a speaker, for example, told his friend that, The train is due at 8 a.m., but I don't believe it, the information would be treated as a linguistic

communication that made use of the speaker's and the listener's cognitive abilities. If the speaker instead had said, The train is due at 8 a.m., using a "tone of voice" that conveyed his disbelief, the semantic construct of "disbelief" would be treated as a paralinguistic phenomenon. Linguists lack adequate transcription systems for the prosodic aspects of language so they solve the problem by treating as non-linguistic the information that they cannot describe with their present theoretical and notational apparatus. The situation is ludicrous. It is as though physicists decided that subatomic physics was not part of physics because the present theory could not readily account for the observed phenomena.

We can avoid painting ourselves into this intellectual corner if we consider what we really mean by the term 'language'. No good analytic definition of language exists. This is an unintended consequence of the search for linguistic "universals". Linguists have, for the most part, attempted to define language in terms of the universal properties that structure all human languages. This is an impossible task. We simply do not know what these universals are. If we did, we would have "solved" the problem of language and would know everything that there is to know about language. The traditional approach towards the definition of language is also anthrocentric in defining language to be necessarily the language of present day Homo sapiens, that is, human language. I think that the following definition of language avoids these problems. I will define a language to be a communications system that is capable of transmitting new information. In other words, I am operationally defining language as a communications system that places no restriction on the nature or the quality of the information transferred.

It is obvious that this definition does not require that all languages have all of the properties of human language. It is also obvious that the "phonetic" elements of human language need not be restricted to the segmental phonetic elements that traditional orthography conveys, nor even to the speech signal. Prosodic contours and gestures can have a role even as they do in the languages of other species, living and extinct.

In connection with this last point, it is probable that an advanced hominid species like classic Neanderthal man (Lieberman, 1972) who lacked many of the segmental phonetic elements that characterize human speech would probably have consistently expressed a semantic construct like disbelief by means of the "tone of his voice" or a gesture or grimace. The cultural remains of specimens of classic Neanderthal man, Homo sapiens neanderthalis, demonstrate that some form of language must have been present. Fairly abstract cognitive ability must have been present in these extinct hominids since ritual burials involving the symbolic use of flowers, the use of advanced tools, and the use of fire are all part of the classic Neanderthal culture (Soleiki, 1972; Boule and Vallois, 1957; Bordes, 1968). Present day Homo sapiens has a great segmental phonetic inventory and the semantic construct of disbelief can be expressed either by means of "tone of voice" or through the use of some additional words.

There clearly is no rigid dichotomy wherein certain semantic constructs are "paralinguistic", others being "linguistic". The rigid dichotomy is an artifice. Any semantic construct that can be paraphrased in terms of a string of words is obviously "linguistic". The use of a phonetic element that cannot be transcribed using the IPA symbol inventory does not make the semantic construct "paralinguistic". There is no clear line of demarcation at the semantic level.

No rigid dichotomy exists at the phonetic level with respect to "paralinguistic" and "linguistic" phonetic units. A phonetic element is really a signalling unit (Lieberman, 1970). Linguists have been accustomed to manipulate the segmental phonetic elements that are, for the most part, the consequence of the articulatory maneuvers of the supralaryngeal vocal tract in Homo sapiens. Sound contrasts like the vowels [a] and [i], for example, are the result of articulatory maneuvers involving only the supralaryngeal vocal tract (Fant, 1960). Many of the phonetic distinctions that differentiate the segmental phonetic elements are, however, the consequence of laryngeal maneuvers, for example, the distinction between the sounds [b] and [p] (Lisker and Abramson, 1964). The distinction between these two sounds rests in the timing between the start of phonation and the release of the primary occlusion of the supralaryngeal vocal tract. Many languages make use of differences in the dynamic pattern of the fundamental frequency of phonation to signal lexical differences. The various dialects of Chinese, for example, make use of variations in fundamental frequency (which are perceived as pitch variations) to differentiate various words. A speaker of American-English does not make use of these distinctions to differentiate the lexical entries of his linguistic "dictionary of words". The speaker of American English is thus free to use these pitch variations, i.e., "tone" features, to simultaneously transmit the semantic construct of disbelief when he utters the words, The train is due at 8 a.m. He might also have shrugged his shoulders or used a facial expression that conveys disbelief. The semantic content is nonetheless the same as if he had also added the words, but I don't believe it.

The speaker thus can make use of phonetic signals that are not intimately associated with the lexical entries in his internal dictionary to

convey semantic information that is considered "paralinguistic" by linguists fixed to the segmental framework of a particular language. In the present company, the particular language in question is English which many linguists appear to implicitly take as the "universal" language.

There is no clear dichotomy at the phonetic level. Prosodic features that have an exclusive "paralinguistic" function in one language may have a "linguistic", lexical function in another language. High fundamental frequency, rising fundamental frequency, breathy voice, etc., cannot therefore be exclusively viewed as "paralinguistic" phonetic features. Nor can we even view gestures or facial expressions as exclusively paralinguistic phonetic features. The lexical entries, i.e., "words" of the sign language of the deaf, for example, make use of a wide variety of manual gestures in concert with articulatory maneuvers of the facial musculature. The language of hominids who lived until comparatively recent times (20,000 - 50,000 years ago) like the people of Shanidar and La Chapelle-aux-Saints also probably made use of these manual and facial gestures to communicate "words". Present day chimpanzees have, for that matter, been taught to communicate lexical information by means of gestures (Gardner and Gardner, 1969). Chimpanzees exhibit cognitive and linguistic abilities that are remarkably similar, though more limited, than adult modern Homo sapiens (Gardner and Gardner, 1969; Premack, 1972). It is probable that the particular phonetic form of human language is a comparatively recent development in hominid evolution (Lieberman, 1973). Cognitive ability, which can take many forms of phonetic expression, must have antedated the appearance of human language.

I don't want to leave the impression that only prosodic and gestural phonetic elements can interchange between conveying "linguistic" and

"paralinguistic" information. Much of the discussion of the phonetic level of "paralinguistic" communication is based on either inadequate or incorrect phonetic and acoustic analyses. One often encounters, for example, the assertion that high fundamental frequency conveys some sort of increased "emotion" on the part of the speaker. Psychoacoustic experiments that transposed the fundamental frequency contour of a synthesized utterance from a "normal" to either "high" or "low" pitch ranges failed to show this result (Lieberman and Michaels, 1962). The same psychoacoustic experiments demonstrated that the expansion, or the compression of the speaker's pitch range also failed to transmit any "emotional" nuances. These results are in accord with recent acoustic and electromyographic investigations that show great variability with respect to these parameters, both between different speakers and the same speaker, when completely "unemotional" test sentences are spoken (Atkinson, 1973). The traditional statements concerning the role of pitch that have been constantly repeated and reprinted for at least fifty years are wrong. We simply don't know what is happening.

I must stress that this does <u>not</u> mean that prosodic features do not convey paralinguistic information. The fine structure of fundamental frequency, that is, the variations in periodicity that occur from one opening and closing cycle of the vocal cords to the next, appear to have a "paralinguistic" function in English (Lieberman, 1961; Lieberman and Michaels, 1962). Dynamic patterns varying the "normal" prosodic pattern also appear to be relevant. The segmental features also can convey "paralinguistic" information in English. One of the "paralinguistic" parameters that speakers normally communicate is their intended sex. (This is not always equivalent to biologically determined sex.) It is obvious that prosodic features convey the speaker's intended sex (Brend, 1971). The segmental phonetic elements also convey the speaker's

intended sex. This is obvious in languages that make use of different lexical entries for men and women (Haas, 1964). It is also true in languages like English where speakers use articulatory maneuvers that result in formant frequency differences that differentiate the segmental phonetic elements of men and women (Mattingly, 1966; Schwartz, 1968; Schwartz and Rine, 1968; Sachs et al., forthcoming). In effect, men and women have slightly different dialects that involve acoustically and perceptually different vowels and consonants. It also appears that these distinctions are the result of acculturation, that they are learned by children as they learn other aspects of their particular dialect (Sachs et al., forthcoming). These distinctions in vowel quality, in languages other than American-English, can be used to differentiate words. There is, therefore, a "paralinguistic-linguistic" interchange. Note, however, that the "paralinguistic" versus "linguistic" interchange is again really arbitrary. The speaker's sex can, if the culture permits, be signalled either through the use of a different word or different set of syntactic or morphophonemic rules, or through the use of a different set of phonetic features. The semantic, cognitive information being transferred is the same; only the means change.

We need not limit our data to the communications of humans, or even primates. The bases of cognitive ability and communication can be seen in the behavior of many species. A dog will signal that he wants water by pushing his water bowl. This is no less an example of cognitive, referential information being communicated than a human requesting a glass of water. We cannot even claim that all of the symbols used by a dog are iconographic. Dogs have been "trained" to ring bells when they want water. They could not do this unless they had the ability to associate an abstract symbol, the bell, with water.

Calling the process "conditioning" does not disguise the cognitive aspects of the problem. Studies of the communications of animals at the neuroelectric level, furthermore, show the presence of "feature" detectors that are tuned to the communicative signals that these animals employ (Capranica, 1965; Wollberg and Newman, 1972). The basic principles that structure human communications may be found with the aid of comparative studies of communication in other species. Human language is the result of a long evolutionary process and it involves factors that are important in many aspects of human and animal behavior besides communication (Lieberman, 1973). It is immaterial whether the communications are labelled "paralinguistic" or "linguistic"; there is no sharp dividing line, for, as Darwin (1859, p. 95) noted, "Natural selection can act only by the preservation and accumulation of infinitesimally small inherited modifications...." Homo sapiens' linguistic abilities only appear to be unique today because the intermediate hominids are extinct. The natural communications of animals like chimpanzee (Goodall, 1971), therefore, are relevant to the study of the basic parameters that underly human language. The paralinguistic-linguistic distinction is again arbitrary.

In conclusion, I think that we should be concerned with the general question of how information is transferred. Whether it is labelled paralinguistic or linguistic is of no concern except to those linguists who want to arbitrarily limit the universe of discourse so that they may claim to have found a "universal" linguistic theory that accounts for all aspects of language.

The test of a scientific theory is not that it accounts for everything, but that it relates a number of phenomena that were seemingly unrelated before the theory was proposed. Newton's Laws of Motion never accounted for frictional phenomena. They nonetheless proved "correct" insofar as they accounted for a

diverse range of phenomena that had appeared to be unrelated. To effectively analyze the problem of language, as I have defined language, we have to carefully investigate the acoustic, perceptual, and physiologic parameters that structure language. We have to reexamine many of the premises that are based on either superficial or inadequate analyses and we cannot arbitrarily limit the data sample. We may not be able to account for all of the phenomena that we observe, but we will be in a position to assess both the generality and the limitations of our theories. Only then can we progress.

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